

Data setter OPX-2A

OPERATING MANUAL BLE Series

Thank you for purchasing an Oriental Motor product.

This operating manual describes product handling procedures and safety precautions.

- Please read it thoroughly to ensure safe operation.
- Always keep the manual where it is readily available.



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1 Safety precautions

The precautions described below are intended to prevent danger or injury to the user and other personnel through safe, correct use of the product. Use the product only after carefully reading and fully understanding these instructions.

Also read the “Safety precautions” sections in the operating manuals for the **BLE** series standard type and electromagnetic brake type.

 Warning	Handling the product without observing the instructions that accompany a “Warning” symbol may result in serious injury or death.
 Caution	Handling the product without observing the instructions that accompany a “Caution” symbol may result in injury or property damage.
Note	The items under this heading contain important handling instructions that the user should observe to ensure safe use of the product.

Warning

General

- Do not use the product in explosive or corrosive environments, in the presence of flammable gases, locations subjected to splashing water, or near combustibles. Doing so may result in fire, electric shock or injury.
- Assign qualified personnel the task of installing, wiring, operating/controlling, inspecting and troubleshooting the product. Failure to do so may result in fire, electric shock or injury.
- When the driver’s protection function is triggered, first remove the cause and then clear the protection function. Continuing the operation without removing the cause of the problem may cause malfunction of the motor and driver, leading to injury or damage to equipment.

Repair, disassembly and modification

- Do not disassemble or modify the data setter. This may cause electric shock or injury. Refer all such internal inspections and repairs to the branch or sales office from which you purchased the product.

Caution

General

- Do not use the motor, gearhead and driver beyond their specifications, or electric shock, injury or damage to equipment may result.

Operation

- Provide an emergency stop device or emergency stop circuit external to the equipment so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury.

Disposal

- To dispose of the data setter, disassemble it into parts and components as much as possible and dispose of individual parts/components as industrial waste.

2 Introduction

Only qualified personnel should work with the product. Use the product correctly after thoroughly reading the section “1 Safety precautions” on p.2.

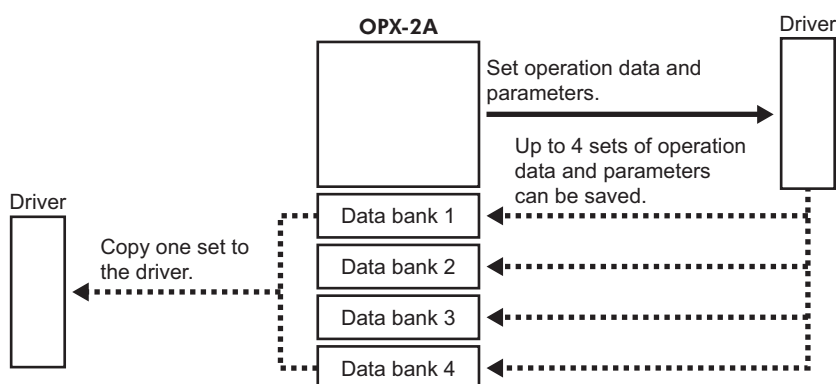
The product described in this manual has been designed and manufactured for use in general industrial machinery, and must not be used for any other purpose. Oriental Motor Co., Ltd. is not responsible for any damage caused through failure to observe this warning.

■ Overview of the product

The **OPX-2A** is a data setter that lets you set operating data and parameters, perform monitoring, etc. Thoroughly read the operating manuals for the **BLE** series standard type and electromagnetic type and understand the basic operating procedures and other details of the driver beforehand, to make sure the **OPX-2A** is used correctly and safely.

■ Features of OPX-2A

The **OPX-2A** can be used not only to set driver operation data and parameters, but it also serves as a storage location for driver data. Driver data is saved in the areas called “data banks”. Four data banks are provided.



The **OPX-2A** can be used for the following purposes:

- Set driver operation data and parameters
- Monitor the operating status of the motor
- The data and parameters set in the driver can be saved to the **OPX-2A**.
- The data and parameters saved in **OPX-2A** can be copied to another driver connected to the **OPX-2A**.

■ Specifications

Connection	Mini DIN, 8 pins
External dimensions	96 (W)×72 (H)×21.5 (D) mm [3.78 (W)×2.83 (H)×0.85 (D) in.]
Cable length	5 m (16.4 ft.)
Mass	0.25 kg (8.8 oz)

■ Hazardous substances

RoHS (Directive 2002/95/EC 27Jan.2003) compliant

■ Expanded functions provided by the OPX-2A

By using the **OPX-2A** you can expand the specifications and functions as follows.

• Specification

Rotating speed : The rotating speed can be digitally set in units of 1 r/min.

Rotating speed range: 80 to 4000 r/min

• Function

Function	Description	Setting mode	Reference
Display of various items	<ul style="list-style-type: none"> • Rotating speed • Transfer speed • I/O (input/output signals) status • Load factor • Alarm code • Warning code 	Monitor mode	P.14
Multi-speed setting	Up to eight sets of operation data can be set, and the rotating speed, torque limit, acceleration time and deceleration time are set for each data set.	Data mode	P.20
Torque limit	Set the limit value of output torque to each operation data.		P.20
Setting of various functions	<ul style="list-style-type: none"> • Gear ratio • Speed increasing ratio • Conveyor gear ratio • Conveyor speed increasing ratio • Rotating speed attainment band • Motor direction selection 	Parameter mode	P.25
Assignment of I/O signals	Change the assignment of I/O signals		P.27
Warning output	Set the warnings that are output before the corresponding alarms generate (warning functions).		P.29
Digital/analog input switching	The rotating speed can be set either as digital or analog.		P.30
Test function	<ul style="list-style-type: none"> • I/O test • Test operation (JOG operation) 	Test mode	P.32
Copy function	<ul style="list-style-type: none"> • Data copy • Data initialize 	Copy mode	P.35

3 Preparation

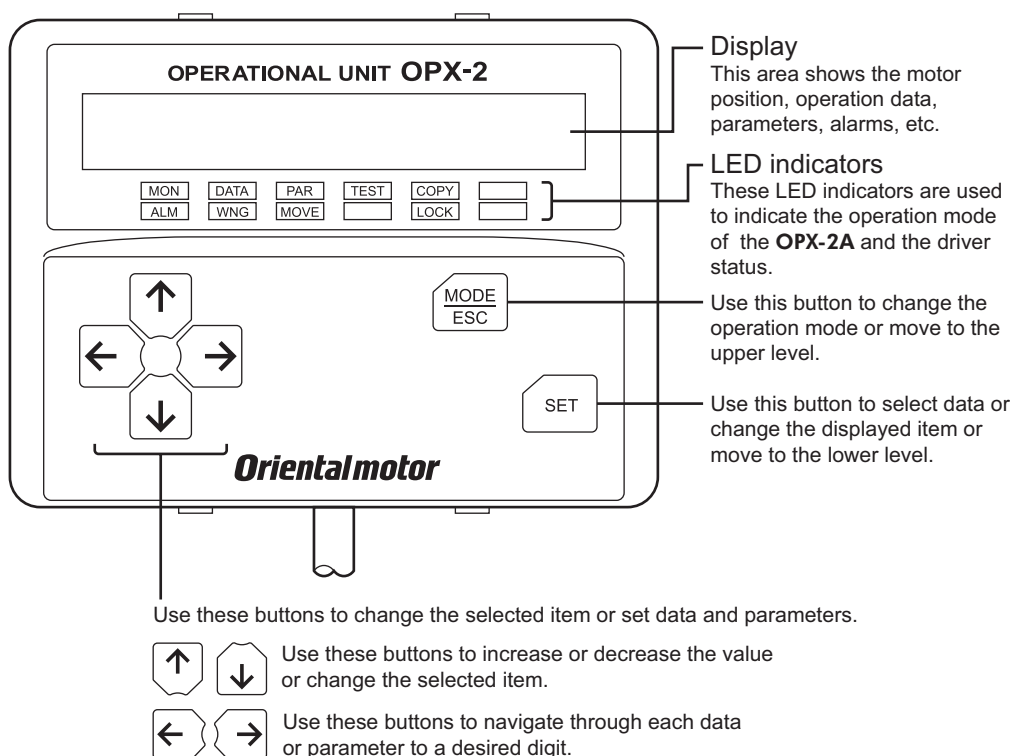
This chapter explains the items you should know before using the data setter **OPX-2A**.

3.1 Checking the product

Verify that the items listed below are included. Report any missing or damaged items to the branch or sales office from which you purchased the product.

- Data setter **OPX-2A** 1 unit
- OPERATING MANUAL (CD-ROM) 1 pc.
- Information 1 copy

3.2 Names and functions of parts



■ Notation

In this manual, keys are denoted by symbols, such as $\left[\begin{smallmatrix} \text{MODE} \\ \text{ESC} \end{smallmatrix} \right]$ $[\text{SET}]$ $[\uparrow]$ $[\downarrow]$ $[\leftarrow]$ $[\rightarrow]$.
In figures, a simplified illustration of the display and LED indicators is used, as shown below.



3.3 How to read the display

The display consists of 7-segment LEDs. (The number “5” and alphabet “S” are the same.)

• Numbers

1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

• Alphabets

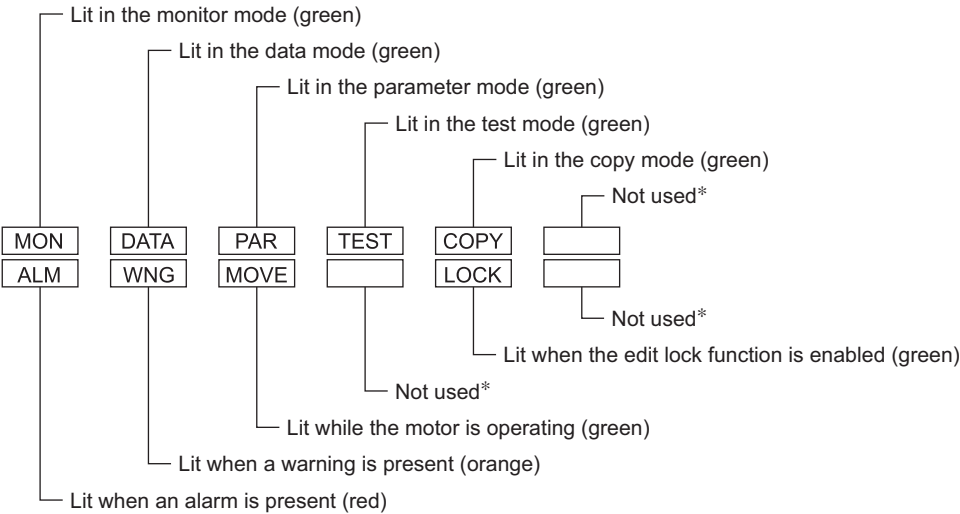
A	A	B	b	C	c	D	d	E	E	F	F	G	G	H	H	I	i	J	j
K	K	L	L	M	m	N	n	O	o	P	P	Q	q	R	r	S	S	T	t
U	U	V	v	W	w	Y	y												

• Signs

+	+	-	-
---	---	---	---

3.4 How to read the LED indicators

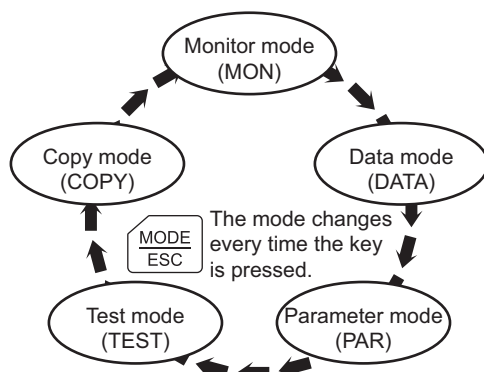
When the operation mode is changed or an alarm or warning generates, a corresponding LED will be lit. While the motor is operating or the edit lock function is enabled, the condition is also indicated by the illumination of a corresponding LED.



* Not lit.

3.5 Types of operation modes

The **OPX-2A** has multiple operation modes. The operation mode will change every time the **【MODE/ESC】** key is pressed.



When the operation mode is changed, the LED indicator corresponding to the previous mode will turn off and the one corresponding to the new mode will be lit.

Identify the current operation mode based on the LED indicator currently lit.

3.6 Edit lock function

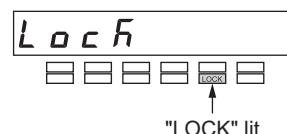
Enable the edit lock function if you want to prevent operation data and parameters from being edited or cleared. Operation data and parameters cannot be changed or deleted while the edit lock function is enabled.

- **Setting the edit lock function**

In the top screen of each operation mode, press the **【MODE/ESC】** key for at least 5 seconds.

The display will show “LoCk” and the edit lock function will be enabled.

The “LOCK” LED in the LED indicator area will also be lit.

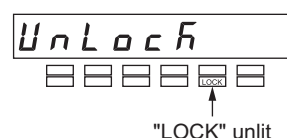


- **Canceling the edit lock function**

Again in the top screen of each operation mode, press the **【MODE/ESC】** key for at least 5 seconds.

The display will show “UnLoCk” and the edit lock function will be cancelled.

The “LOCK” LED in the LED indicator area will turn off.

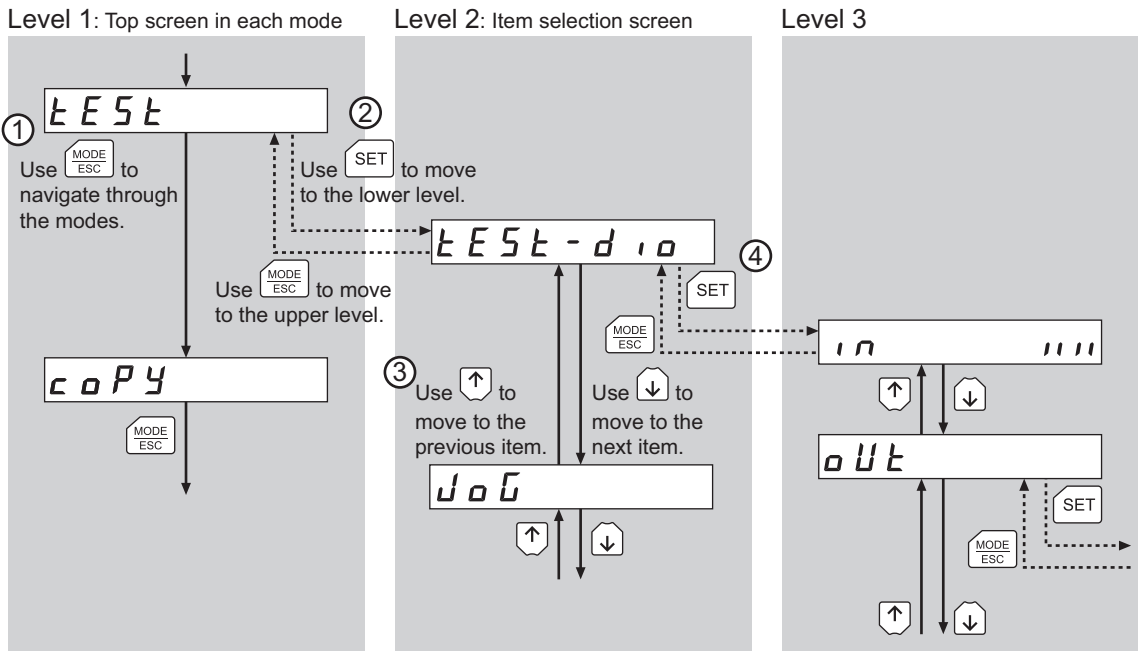


3.7 Basic operations of the OPX-2A

Use the six keys $\left[\begin{smallmatrix} \text{MODE} \\ \text{ESC} \end{smallmatrix} \right]$ $\left[\text{SET} \right]$ $\left[\uparrow \right]$ $\left[\downarrow \right]$ $\left[\leftarrow \right]$ $\left[\rightarrow \right]$ to set data and operate the motor.

■ Operation flow

The **OPX-2A** is operated according to the flow shown below.



- ① Use the $\left[\begin{smallmatrix} \text{MODE} \\ \text{ESC} \end{smallmatrix} \right]$ key to select a desired operation mode appropriate for your intended operation.
Example: If you want to use a function in the test mode, press the $\left[\begin{smallmatrix} \text{MODE} \\ \text{ESC} \end{smallmatrix} \right]$ key to select the test mode (indicated by a lit “TEST” LED). The top screen of the test mode is displayed.
- ② Press the $\left[\text{SET} \right]$ key to move to the lower level.
- ③ Use the $\left[\uparrow \right]$ $\left[\downarrow \right]$ keys to select a desired item.
- ④ To move to the lower level, press the $\left[\text{SET} \right]$ key.
To return to the previous level, press the $\left[\begin{smallmatrix} \text{MODE} \\ \text{ESC} \end{smallmatrix} \right]$ key.

As explained above, use the $\left[\text{SET} \right]$ key to navigate through the levels and use the $\left[\uparrow \right]$ $\left[\downarrow \right]$ keys to select a desired item. This is the basic operation flow.

■ How to input values

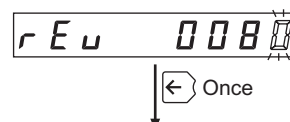
As an example, how to set the rotating speed to 1000 r/min from 80 r/min is explained.

Basic operations

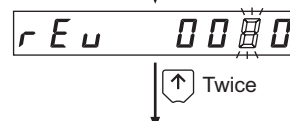
- Use the 【↑】 【↓】 keys to increase/decrease the value or change the sign.
- Use the 【←】 【→】 keys to move to the digit you want to edit.
- If positive and negative values are differentiated, each value is preceded by a sign.
- You can edit the digit currently blinking.

1. First, change the 10's place from "8" to "0".

Press the 【←】 key once to move to the 10's digit you want to edit.

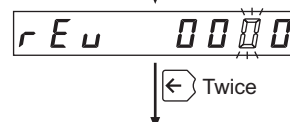


2. Press the 【↑】 key twice to change the value to "0".

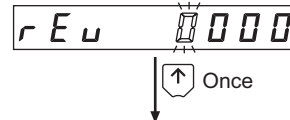


3. Next, change the 1000's place from "0" to "1".

Press the 【←】 key twice to move to the 1000's digit you want to edit.

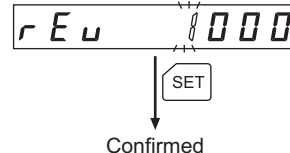


4. Press the 【↑】 key once to change the value to "1".



5. After all digits have been changed, press the 【SET】 key to confirm the value.

All digits comprising the value blink for approx. 2 seconds.



Confirmed

3.8 Rewriting the driver's EEPROM

Operation data and parameters are saved to the driver's EEPROM. The EEPROM can be rewritten approx. 100,000 times.

The EEPROM will be rewritten after one of the following operations is performed:

- Edit any operation data or parameter
- Download data from the **OPX-2A** to the driver
- Initialize driver data

4 Installation and connection of the OPX-2A

4.1 Location for installation

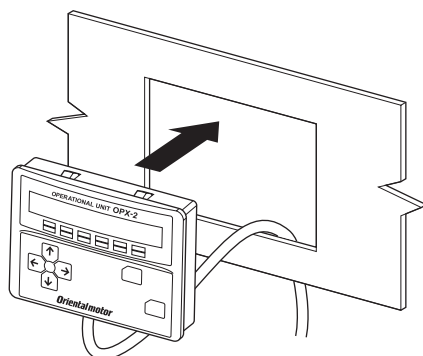
The **OPX-2A** is designed and manufactured for installation in equipment.

Install it in a well-ventilated location that provides easy access for inspection. The location must also satisfy the following conditions:

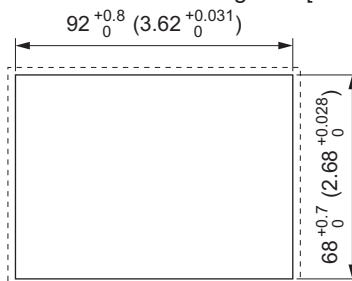
- Inside an enclosure that is installed indoors (provide vent holes)
- Operating ambient temperature 0 to +40 °C (+32 to +104 °F) (non-freezing)
- Operating ambient humidity 85% or less (no condensation)
- Area that is free of explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles or the like
- Area not subject to splashing water (rain, water droplets), oil (oil droplets) or other liquids
- Area free of excessive salt
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields or vacuum
- 1000 m (3300 ft.) or less above sea level

4.2 Installation method

Using a metal plate of 1 to 3 mm (0.04 to 0.12 in.) in thickness, insert the **OPX-2A** into the mounting hole from the front side and securely affix the **OPX-2A**.

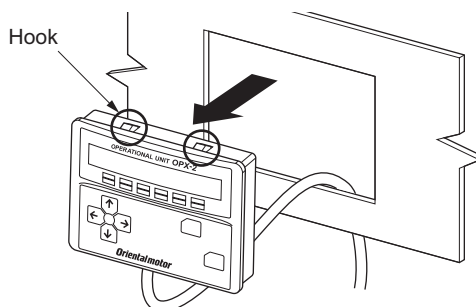


- Dimension of mounting hole [mm (in.)]



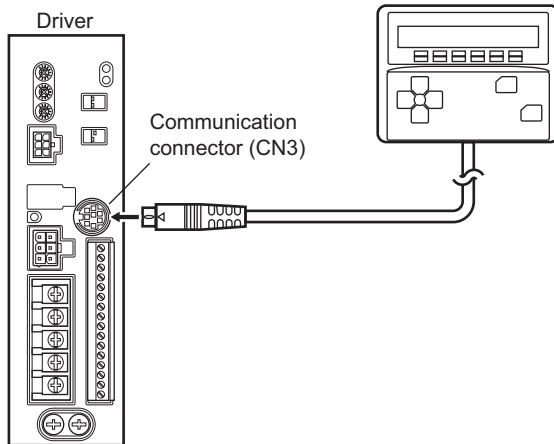
Removing method

Press all of the four hooks provided on top and bottom of the **OPX-2A**. In this condition, press the **OPX-2A** forward to release.



4.3 Connecting to the driver

Plug the connector attached to the end of the **OPX-2A** cable into the communication connector (CN3) on the driver, and then turn on the power to the driver.

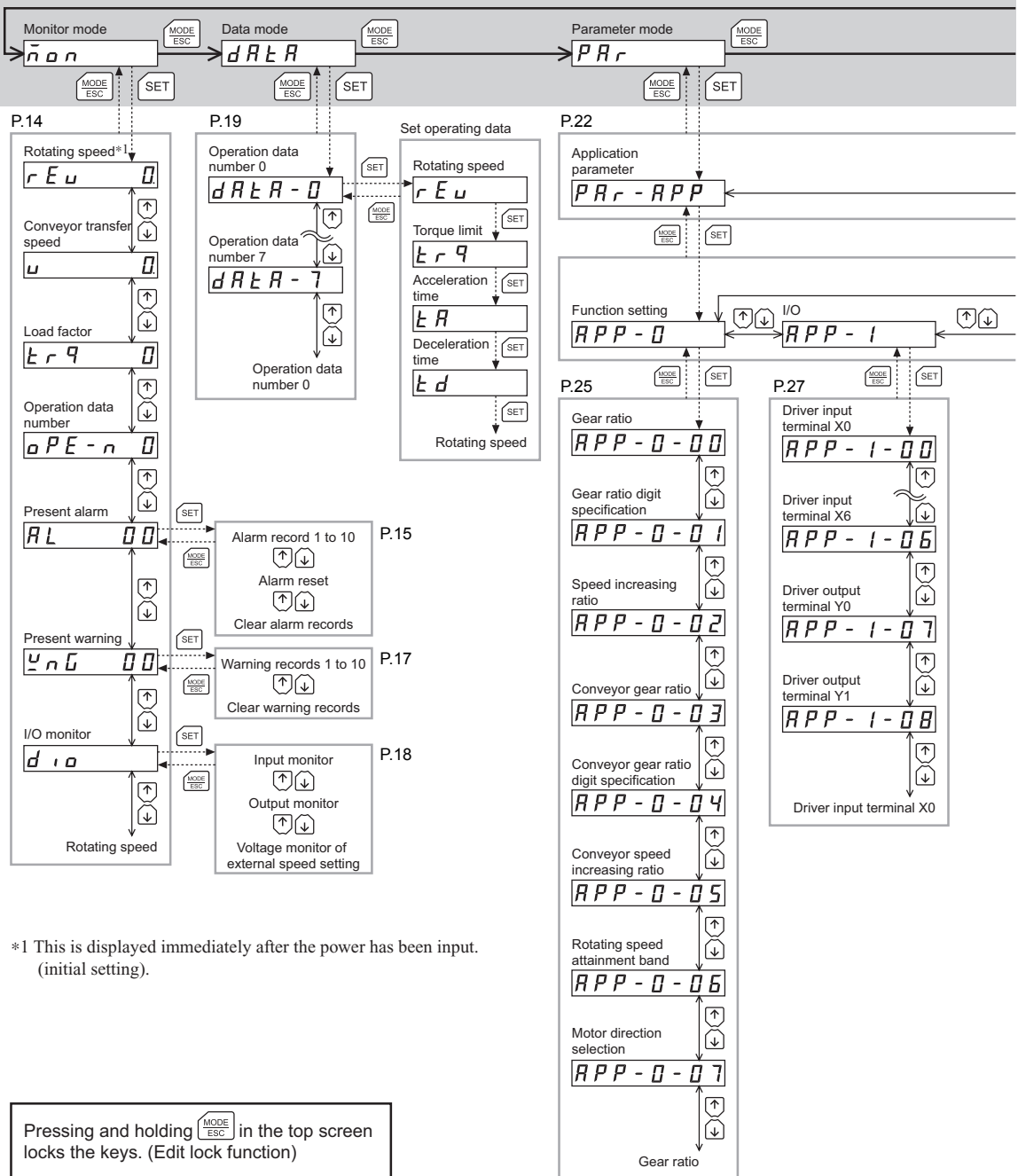


Note

- When operation data and parameters are set on the **OPX-2A**, they will be stored in the driver. Once stored in the driver, the data will not be cleared even after the **OPX-2A** is disconnected from the driver.
- Turning on the power to the driver will also turn on the power to the **OPX-2A**. Turning off the driver power will turn off the **OPX-2A** power.
- Turn off the driver power before connecting or disconnecting the **OPX-2A** cable.

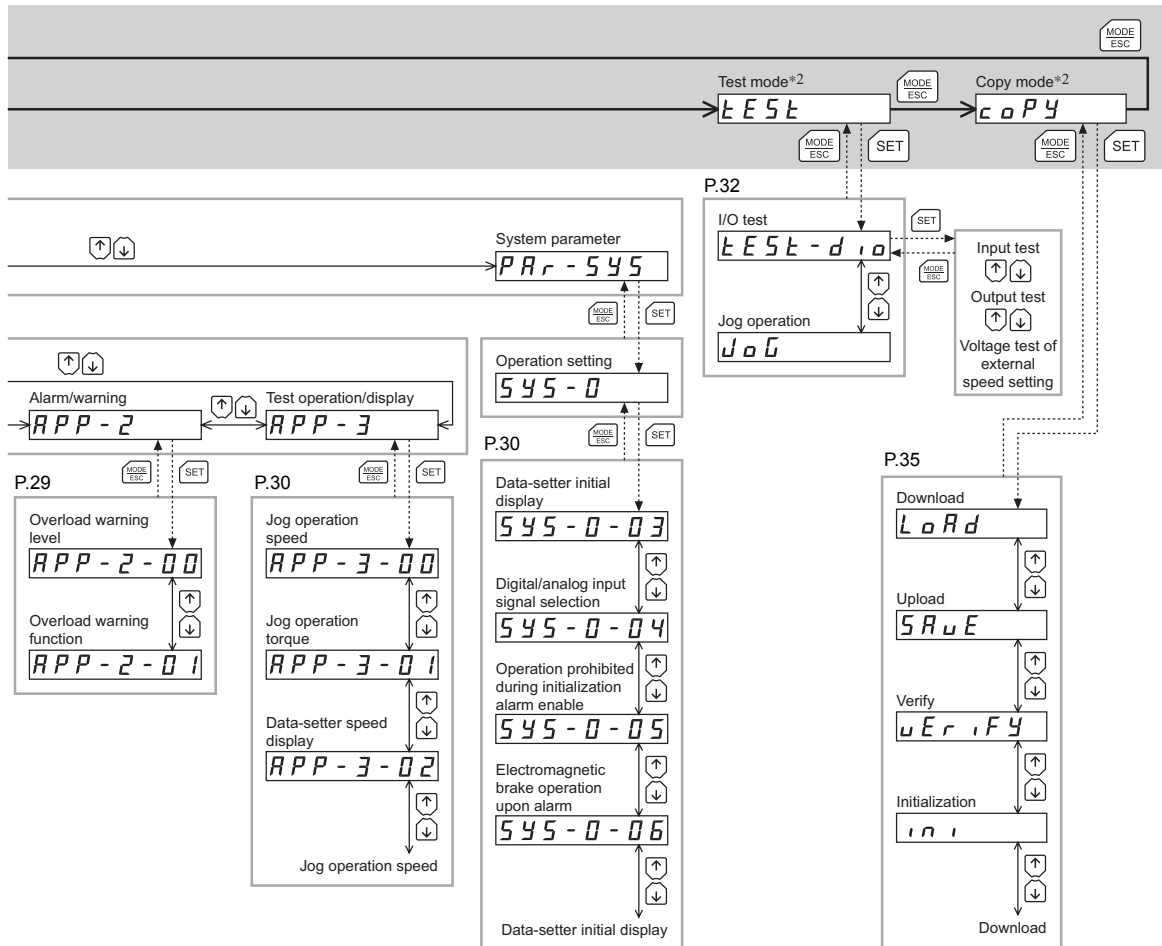
5 Screen transitions

Top screen



Note

The following operations cannot be performed while the edit lock function (p.7) is enabled:
 Edit operation data, edit parameters, clear alarm/warning records and perform operations in the copy mode



*2 Operations in the test mode and copy mode are disabled while the motor is running.

6 Monitor mode

6.1 What you can do in the monitor mode

- Monitoring the operating status

You can monitor the motor rotating speed, conveyor transfer speed, load factor and operation data number corresponding to the current operation.

- Checking alarms/warnings, clearing alarm/warning records, and resetting alarms

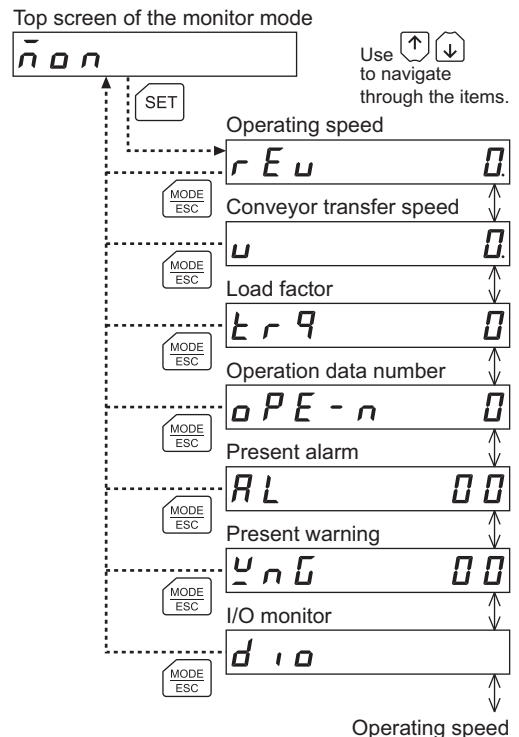
- If an alarm or warning generates, a corresponding alarm code or warning code will be displayed.
You can check the code to identify the details of the alarm/warning.
- Up to ten most recent alarms/warnings can be displayed, starting from the latest one.
- You can reset the alarms currently present.
- You can clear alarm/warning records.

- Checking I/O signals

Check the ON/OFF status of I/Os and input voltage of external speed setting.

6.2 Operation in the monitor mode

- Use the **[MODE/ESC]** key to select the monitor mode.
- Press the **[SET]** key in the top screen of the monitor mode.
The display changes to the monitor mode item screen.
- Use the **[↑]** **[↓]** keys to select the item you want to monitor.



6.3 Monitored items

■ Operating speed (unit: r/min)

You can check the rotating speed of the motor.

While the motor is rotating in the counter clockwise direction (CCW), “—” is shown in front of the displayed value.

This speed can also be displayed as the absolute value. To display the rotating speed as absolute value, change the setting of the data-setter speed display parameter [APP-3-02] (p.30).

You can also display the rotating speed of the motor as the rotating speed of the gear output shaft. To do this, set the gear ratio parameter [APP-0-00] (p.25) and gear ratio digit specification parameter [APP-0-01] (p.25). It is also possible to increase the rotating speed and display the increased speed. For this, set the speed increasing ratio parameter [APP-0-02] (p.25).

■ Conveyor transfer speed (unit: m/min)

you can check the conveyor transfer speed.

Set the Conveyor gear ratio parameter [APP-0-03] (p.25) and conveyor gear ratio digit specification parameter [APP-0-04] (p.25). It is also possible to increase the rotating speed and display the increased speed. For this, set the conveyor speed increasing ratio parameter [APP-0-05] (p.25).

■ Load factor (unit: %)

You can check the generated torque of the motor. The current load factor is monitored based on the rated torque being 100%.

■ Operation number

you can check the operation data number corresponding to the current operation.

■ Present alarm

When an alarm generates, the ALM LED (red) on the **OPX-2A** is lit.

When this LED is lit, you can change the display to the alarm code mode to check the details of the alarm. For the operating procedure, refer on p.14.

You can also reset alarms or check and clear alarm records. See p.40 for the cause of the alarm and remedial actions

• Alarm code list

Code	Alarm name	Resetting on the OPX-2A	Number of driver's ALARM LED blinks
20	Overcurrent	Not possible	7
22	Overvoltage	Possible	4
25	Undervoltage	Possible	5
28	Sensor error	Possible	3
2D	Main circuit output error	Possible	14
30	Overload	Possible	2
31	Overspeed	Possible	6
41	EEPROM error	Not possible	8
42	Sensor error during initialization	Possible	3
46	Operation prohibited during initialization	Possible	11
51	Regeneration unit overheat	Possible	9
6E	External stop	Possible	10

Note

Do not turn off the driver power while an alarm is being reset or alarm records are being cleared (= while the display is blinking). Doing so may damage the data.

- How to reset an alarm

Be sure to remove the cause of the alarm, and then reset the alarm by following the steps below:

1. While an alarm is displayed, press the **[SET]** key to move to the lower level.
2. Press the **[↑]** key twice to select the alarm reset screen.
3. Press the **[SET]** key.

The alarm is reset.

Note

Overcurrent and EEPROM error alarms cannot be reset on the **OPX-2A**. To reset these alarms, you must cycle the power (p.40).

- How to check an alarm record

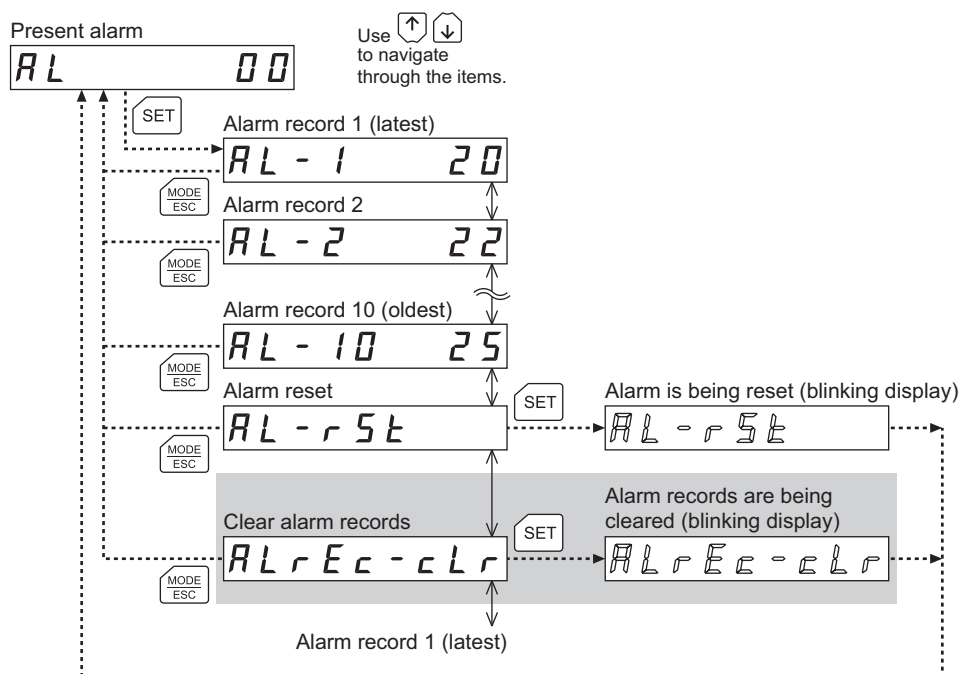
You can check up to ten most recent alarms, starting from the latest one.

1. While an alarm is displayed, press the **[SET]** key to move to the lower level.
The latest alarm is displayed.
2. Press the **[↓]** key.
The second latest alarm is displayed.
3. Every time the **[↓]** key is pressed, the next older alarm will be displayed. Use the **[↑]** **[↓]** keys to select the alarm record you want to check.

- How to clear all alarm records

You can clear all alarm records at once.

1. While an alarm is displayed, press the **[SET]** key to move to the lower level.
2. Press the **[↑]** key and select the alarm record clear screen.
3. Press the **[SET]** key.
All alarm records are cleared.



* If operations are limited by the edit lock function (p.7), the screen text in gray is not shown.

■ Present warning

When an warning generates, the **WNG** LED (orange) on the **OPX-2A** is lit. When this LED is lit, you can change the display to the warning code mode to check the details of the warning . For the operating procedure, refer to “6.2 Operation in the monitor mode” on p.14.

You can also check or clear warning records.

• Warning generation conditions

Description	Condition
Overload warning*	The motor received a load exceeding the overload detection level (load factor) set by the warning parameter [APP-2].
Operation prohibited	<ul style="list-style-type: none"> The FWD input or REV input was ON when the test mode was ended after performing test (JOG) operation in the test mode. The FWD input or REV input was ON when the assignment of an input terminal was changed using the corresponding applicable I/O parameter.

* When the overload warning function is enabled. (For the method to set the function, see p.29.)

• Warning code list

Code	Warning name	Motor operation
30	Overload	Operation
6C	Operation prohibited	Stop

Note

Do not turn off the driver power while warning records are being cleared (= while the display is blinking). Doing so may damage the data.

• How to reset an warning

Even when a warning generates, the motor and driver continue to operate without stopping. Once the cause of the warning is removed, the warning output will turn OFF automatically.

If an operation prohibited warning is generated, an operation command by the FWD input or REV input will not take effect and the motor will not operate.

The operation prohibited warning will automatically be cleared by turning OFF the operation input.

• How to check a warning record

You can check up to ten most recent warnings, starting from the latest one.

1. While a warning is displayed, press the **【SET】** key to move to the lower level.
The latest warning is displayed.
2. Press the **【↓】** key.
The second latest warning is displayed.
3. Every time the **【↓】** key is pressed, the next older warning will be displayed. Use the **【↑】** **【↓】** keys to select the warning record you want to check.

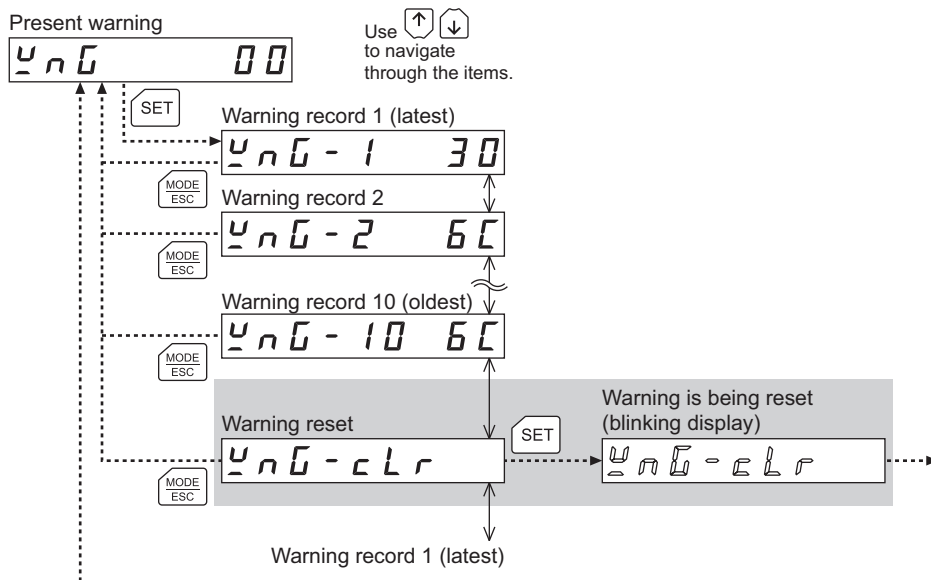
• How to clear all warning records

You can clear all warning records at once.

1. While a warning is displayed, press the **【SET】** key to move to the lower level.
2. Press the **【↑】** key and select the warning record clear screen.
3. Press the **【SET】** key.
All warning records are cleared.

Note

You can also clear warning records by turning off the driver power.



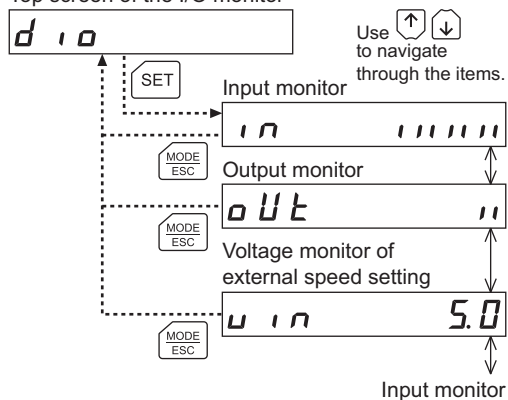
* If operations are limited by the edit lock function (p.7), the screen text in gray is not shown.

I/O monitor

You can check the ON/OFF status of each I/O signal of the driver (Lit: ON, Unlit: OFF).

Use the keys to select the input signals or output signals.

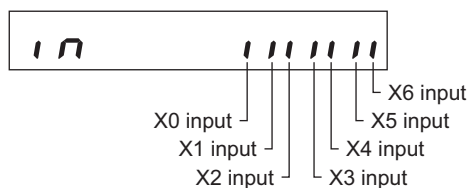
Top screen of the I/O monitor



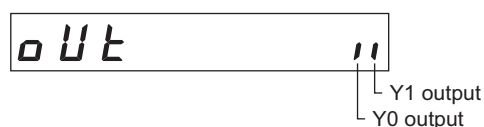
Monitoring the I/O

On the monitor screen of the user I/O, Each digit on the 7-segment LED display corresponds to a signal. If the signal is ON, the corresponding digit is lit. If the signal is OFF, the digit is unlit.

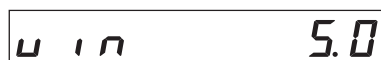
Input monitor



Output monitor



Voltage monitor of external speed setting (display unit: V)



When setting the speed by means of external DC voltage, you can monitor whether voltage is input. If 10 VDC is selected, a value corresponding to one half the input voltage is displayed.

7 Data mode

Up to eight sets of operation data can be set. Also the limit value of the motor output torque can be set in operation data.

Once set, the operation data is stored in the driver. The data will not be lost even after the **OPX-2A** is disconnected from the driver.

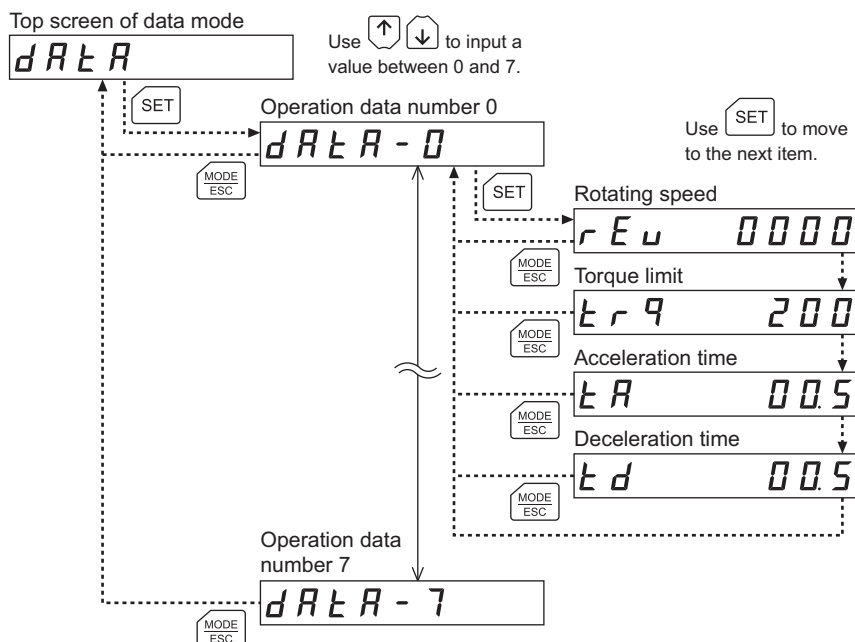
Before setting operation data, read the **BLE** Series standard type and electromagnetic type OPERATING MANUAL carefully to understand the basic operations, functions and other details of the driver.

Note

- Operation data have significant bearing on motor operation. Before setting any operation data, make sure you fully understand the content of the data.
- If operations are limited by the edit lock function (p.7), the operation data is not edit.

7.1 Operation in the data mode

1. Use the **[MODE/ESC]** key to select the data mode.
2. Press the **[SET]** key in the top screen of the data mode
3. Use the **[↑]****[↓]** keys to select the operation data number.
4. Press the **[SET]** key.
The display changes to the operation data setting screen.
5. Use the **[SET]** key to select the item you want to set.
6. Pressing the **[SET]** key on the screen showing the last operation data item will return the display to the operation number selection screen.



7.2 Setting items

Item	Initial value	Setting range	Description	Setting unit
Rotating speed	0	0 [r/min] and 80 to 4000 [r/min]	Set the rotating speed.	1
Torque limit ^{*1}	200	0 to 200 [%]	Sets the torque limit value.	1
Acceleration time ^{*2}	0.5	0.2 to 15.0 [s]	Set the acceleration time over which to reach the target speed.	0.1
Deceleration time ^{*2}	0.5	0.2 to 15.0 [s]	Set the deceleration time over which to reach the target speed.	0.1

*1 The default value is motor starting torque. The rated torque being 100%.

*2 As in the case being set digitally by the **OPX-2A**. If any analog setting mode (internal potentiometer, external potentiometer or external DC voltage) is selected, the time over which to reach the rated rotating speed (3000 r/min) is indicated. The actual acceleration time and deceleration time vary depending on the conditions of use, load inertia, load torque and other settings specified by the customer.

Note If the value you have input is outside the setting range, "Error" will be displayed for 1 second. If this error display appears, input a different value that falls within the setting range.

7.3 Multi-speed operation

You can set operation data under operation data Nos.0 to 7 to perform multi-speed operation.

- Change the assignment of I/O signals

Assign the M0, M1 and M2 input to the input terminal X0 to X6. See p.27 for the assignment method.

- Select the operation data

Desired operation data number can be selected by a combination of ON/OFF statuses of M0, M1 and M2 inputs of the driver.

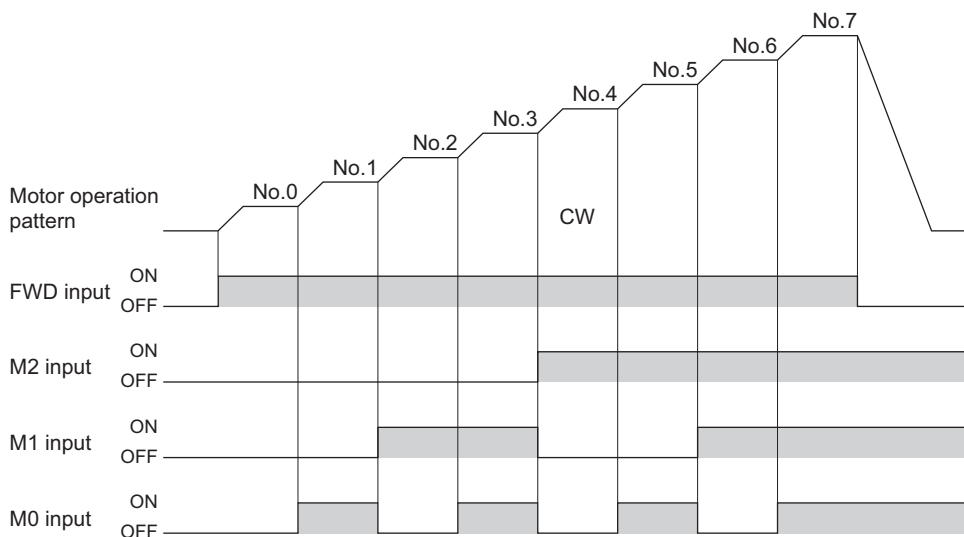
The speed setting method for operation data No.0 can be switched between internal potentiometer and digital setting, while the speed setting method for operation data No.1 can be switched between external potentiometer and digital setting.

For the switching method, refer to the digital/analog input signal selection parameter [SyS-0-04] (p.30).

Operation data number	M0 input	M1 input	M2 input	How to set speed
0	OFF	OFF	OFF	Internal potentiometer/digital setting
1	ON	OFF	OFF	External potentiometer/digital setting
2	OFF	ON	OFF	Digital setting
3	ON	ON	OFF	
4	OFF	OFF	ON	
5	ON	OFF	ON	
6	OFF	ON	ON	
7	ON	ON	ON	

To turn ON the M0, M1 and M2 inputs, wait for at least 10 ms after the FWD input or REV input has turned ON. If an attempt is made to turn ON the M0 to M2 inputs within 10 ms after turning ON the FWD input or REV input, the M0 to M2 inputs will not be accepted.

Example: Run the motor in the clockwise (CW) direction and switch the operation data (8th speed)



7.4 Initializing operation data

You can revert operation data saved in the driver to their initial values.
For details, refer to 10.6, “Initializing driver data” on p.39.

8 Parameter mode

You can set parameters relating to motor operation and control. These parameters are saved in the driver. Before setting operation data, read the **BLE** Series standard type and electromagnetic type OPERATING MANUAL carefully to understand the basic operations, functions and other details of the driver.

Note Parameters have significant bearing on motor operation. Before setting any parameter, make sure you fully understand the content of the parameter.

8.1 Types of parameters

Application parameters and system parameters are handled in the parameter mode.

■ Application parameters

When an application parameter is changed, the new parameter becomes effective immediately. Four types of parameters are available on the levels below the application parameter screen. These parameters are classified as follows.

Parameter classification	Description
Function setting	Set parameters relating to the gear ratio and speed increasing ratio of operating speed and conveyor transfer speed, rotating speed attainment band, and rotating direction of the motor.
I/O	Assign the input/output signals.
Alarm/warning	Set whether to enable/disable the overload warning and the detection level.
Test operation/display	Set the rotating speed used in jog operation in the test mode, as well as the display method of monitored speed on the data setter.

■ System parameters

When a system parameter is changed, the new parameter will become effective only after the power is cycled.

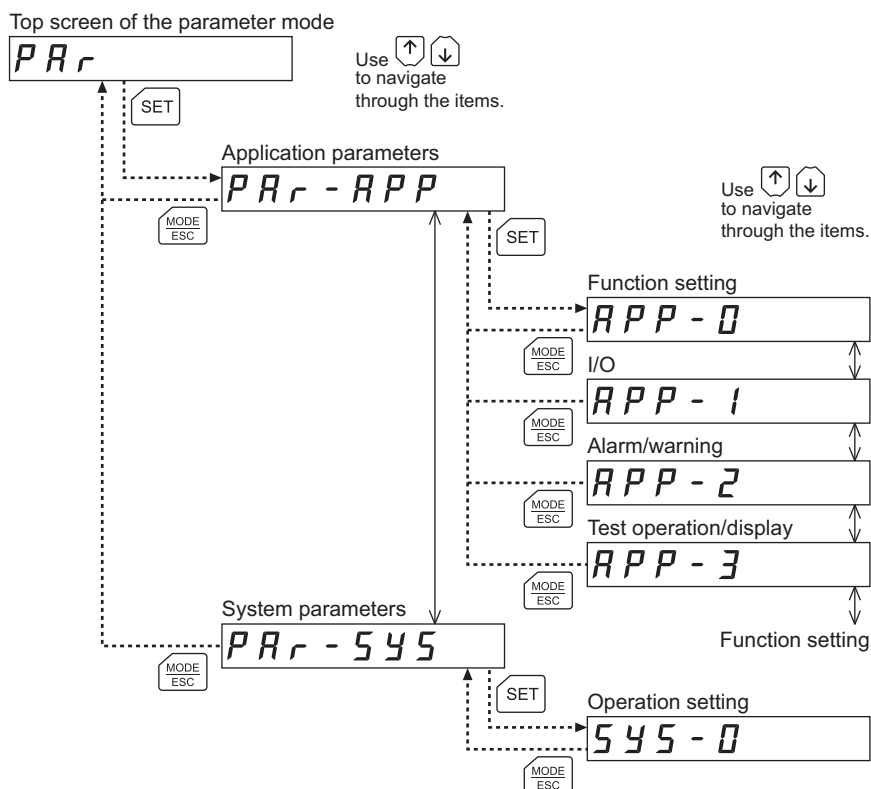
One parameter is available on the levels below the system parameter screen. This parameter is classified as follows.

Parameter classification	Description
Operation setting	Set the initial display of the data setter, digital/analog input signal selection, whether to enable/disable the operation prohibited during initialization alarm, and operation timing of the electromagnetic brake upon occurrence of an alarm*.

* Electromagnetic brake type only.

8.2 Operation in the parameter mode

1. Use the **MODE/ESC** key to select the parameter mode.
2. Press the **SET** key in the top screen of the parameter mode, and use the **↑** **↓** keys to select the application parameters or system parameters.
3. Press the **SET** key again to move to the parameter item screen.
4. Use the **↑** **↓** keys to select the parameter you want to change.


Note

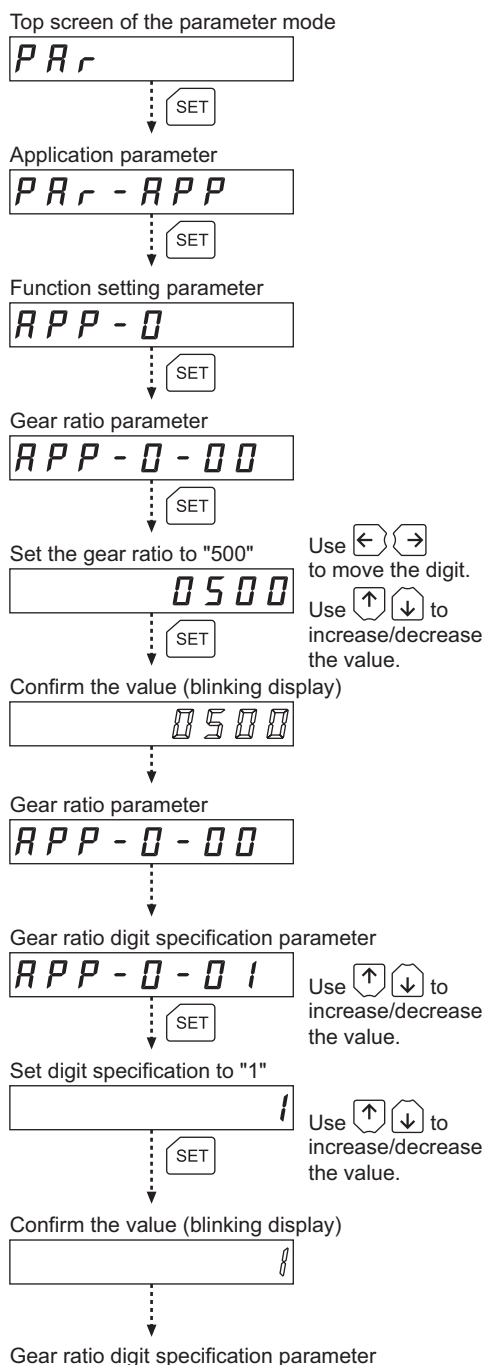
If the value you have input is outside the setting range, "Error" will be displayed for 1 second. If this error display appears, input a different value that falls within the setting range.

8.3 Setting example

Pressing the **[SET]** key in the parameter item screen enables parameter setting.
How a parameter is set are explained below.

Example: Set the gear ratio to "50.0"

1. Use the **[MODE/ESC]** key to select the parameter mode.
The "PAR" LED is lit.
2. Press the **[SET]** key.
The display changes to the application parameter screen.
3. Press the **[SET]** key.
The display changes to the function setting screen.
4. Press the **[SET]** key.
The screen for setting the gear ratio is displayed.
5. Press the **[SET]** key, move the editing digit (blinking digit) to the third digit from the right using the **[←]** key, and then use the **[↑]** **[↓]** keys to select "5."
6. Press the **[SET]** key.
The selected value is set, and the display returns to the screen for setting the gear ratio.
7. Use the **[↑]** **[↓]** key to select "1."
The screen for setting the gear ratio digit specification is displayed.
8. Press the **[SET]** key, and use the **[↑]** **[↓]** key to select "1."
The last digit of the gear ratio set in step 6 becomes the decimal position.
9. Press the **[SET]** key.
The selected value is set, and the display returns to the screen for setting the gear ratio digit specification.



Note

If the value you have input is outside the setting range, "Error" will be displayed for 1 second. If this error display appears, input a different value that falls within the setting range.

8.4 Description of application parameters

■ Function setting parameters

Use to navigate through the items.

	Initial value	Setting range*	Description
	100	100 to 9999	Set the numerical part of the gear ratio relative to the rotating speed of the motor output shaft.
	2	0, 1, 2	Set the position of the decimal point in the set value of the gear ratio.
	1	1, 2, 3, 4, 5	Set the speed increasing ratio relative to the rotating speed of the motor output shaft.
	100	100 to 9999	Set the numerical part of the conveyor gear ratio relative to the rotating speed of the motor output shaft.
	2	0, 1, 2	Set the position of the decimal point in the set value of the conveyor gear ratio.
	1	1, 2, 3, 4, 5	Set the conveyor speed-increasing ratio relative to the rotating speed of the motor output shaft.
	200	0 to 400 [r/min]	Set the band within which the rotating speed of the motor is deemed to have reached the set value.
	1	0: CCW 1: CW	Set the motor direction to be applied when the FWD input (CW) is turned ON.

* Setting unit: 1

Note If the speed increasing ratio is set to 1, the gear ratio becomes effective. If the speed increasing ratio is other than 1, the speed increasing ratio becomes effective.

• How to set the gear ratio

Set the gear ratio as a combination of the gear ratio parameter [APP-0-00] and gear ratio digit specification parameter [APP-0-01]. The relationships of gear ratio and decimal position are explained by the combinations shown below.

Actual gear ratio	"Gear ratio" parameter [APP-0-00]	"Gear ratio digit specification" parameter [APP-0-01]
1.00 to 9.99	100 to 999	2
10.0 to 99.9		1
100 to 999		0
10.00 to 99.99	1000 to 9999	2
100.0 to 999.9		1
1000 to 9999		0

- Display after setting the gear ratio

- Gear ratio

Gear ratio 1.00 to 9.99

 r/min

Gear ratio 10.00 to 99.99

 r/min

Gear ratio 100.0 to 999.9

 r/min

Gear ratio 1000 to 9999

 r/min

- Speed increasing ratio

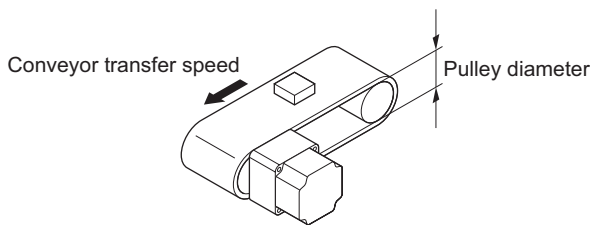
Speed increasing ratio 2 to 5

 r/min

- Display the conveyor transfer speed

To display the conveyor transfer speed on **OPX-2A**, set the conveyor gear ratio by using the formula below:

$$\text{Conveyor gear ratio} = \frac{1}{\text{Feed rate per motor revolution}} = \frac{\text{Gearhead gear ratio}}{\text{Pulley diameter [m]} \times \pi}$$



When the calculated conveyor gear ratio is used, the conveyor transfer speed is converted as follows:

$$\text{Conveyor transfer speed [m/min]} = \frac{\text{Motor output shaft rotating speed [r/min]}}{\text{Conveyor gear ratio}}$$

Example: The pulley diameter is 0.1 m and gear ratio of the gear head is 20

$$\text{Conveyor gear ratio} = \frac{\text{Gearhead gear ratio}}{\text{Pulley diameter [m]} \times \pi} = \frac{20}{0.1 \text{ [m]} \times \pi} \div 63.7$$

From the conversion formula, the conveyor gear ratio is calculated as 63.7 in this example. This means that the conveyor gear ratio parameter is 637, while the conveyor gear ratio digit specification parameter is 1.

If the gear ratio is 63.7 and rotating speed of the motor is 1300 r/min, the conveyor transfer speed is converted as follows:

$$\text{Conveyor transfer speed [m/min]} = \frac{1300}{63.7} \div 20.4$$

Accordingly, “20.4” is shown on the **OPX-2A**.

■ I/O parameters

You can change the assignments of I/O signal terminals using I/O parameters.

Driver terminal to be assigned a signal	Signal name	Name	Description
Input signal terminal X0 to X6	FWD	Forward input	The motor will rotate in the clockwise (CW) direction.
	REV	Reverse input	The motor will rotate in the counter clockwise (CCW) direction.
	STOP-MODE	Stop mode selection input	Select either instantaneous stop or deceleration stop.
	M0	Speed setting selection input	Select operation data by a combination of ON/OFF statuses of M0 to M2 inputs. (see P.20.)
	M1*		
	M2*		
	ALARM-RESET	Alarm reset input	Alarms are reset when the driver's protective function is actuated.
	EXT-ERROR*	External error input	The motor stops when the external error signal is input (normally closed). Turn the signal ON to operate the motor (normally closed).
	MB-FREE	Electromagnetic brake release input	When the motor stops, the electromagnetic brake is released and the motor shaft becomes free.
	TH	Regeneration resistor thermal input	If the regeneration unit is connected, connect the thermostat outputs of the regeneration unit (normally closed).
Output signal terminal Y0+, Y0–, Y1+, Y1–	SPEED-OUT	SPEED-OUT output	30 pulses are output per each revolution of the motor output shaft. (In the FBL II compatible mode, 12 pulses are output per revolution.)
	ALARM-OUT1	ALARM-OUT1 output	This signal is output when an alarm generates (normally closed).
	MOVE output*	Motor running output	This signal is output while motor operate (operation input is ON).
	VA output*	Speed attainment output	This signal is output when the motor rotating speed reaches the set value. (including the rotating speed attainment band).
	ALARM-OUT2*	ALARM-OUT2 output	If the overload warning function is enabled, this signal is output when the overload warning detection level is exceeded. Even when the overload warning function is disabled, this signal is still output when an overload alarm generates (normally closed).
	WNG output*	Warning output	This signal is output when the overload warning function actuates and a warning generates. To reset the warning, the WNG output will automatically return to OFF.
	TLC output*	Torque limit output	This signal is output when the motor output torque reaches the limit value.

* These functions will become effective using the **OPX-2A**.

- Functions expandable using the **OPX-2A**

Speed setting selection input (M0, M1, M2)

Select operation data by a combination of ON/OFF statuses of M0 to M2 inputs.
Set the operation data in the data mode (P.19).

EXT-ERROR input (External error input)

The motor stops when the external error signal is input. Turn the signal ON to operate the motor (normally closed).

MOVE output (Motor running output)

This signal is output while motor operate.

VA output (Speed attainment output)

This signal is output when the difference between the set rotating speed and actual rotating speed of the motor becomes equal to or less than the value set by the rotating speed attainment band parameter [APP-06-00].

ALARM-OUT2 output

When the overload detection level is exceeded, the ALARM-OUT2 output will turn OFF. Once the load drops to below the detection level, the output will return to the ON status.

The detection level can be set using the "overload warning detection level" parameter [APP-2-00].

Once the overload protection function is actuated the ALARM-OUT2 output will always turn OFF.



WNG output (Warning output)

If a warning generates, the WNG output will turn ON. Once the warning is reset, the WNG output return to OFF.

For the types of warnings, refer to p.17.

TLC output (Torque limit output)



This signal is output when the motor output torque reaches the limit value.

Use   to navigate through the items.

Initial value	Setting range	Description
1	0: None 1: FWD input 2: REV input 3: M0 input 4: M1 input 5: M2 input 6: STOP-MODE input 7: ALARM-RESET input 8: EXT-ERROR input 9: MB-FREE input 10: TH input	Set the functions to be assigned to the X0 to X6 input signals.*
2		
6		
3		
7		
9		
10		
6		
5		
6	0: none 1: MOVE output 2: VA output 3: ALARM-OUT2 output 4: WNG output 5: ALARM-OUT1 output 6: SPEED-OUT output 7: TLC output	Set the functions to be assigned to the Y0 and Y1 output signals.
5		

* If same values are assigned, priority will be given in the order of X0 terminal.

■ Alarm/warning parameters

Use   to navigate through the items.

Initial value	Setting range	Description
100	50 to 100 [%]*	Set the detection level (load factor) of the overload warning function. The rated torque being 100%.
0	0: Disable 1: Enable	Enable/disable the overload warning function.

* Setting unit: 1

■ Test operation/display parameters

Use to navigate through the items.

Initial value	Setting range	Description
300	0 [r/min], and 80 to 1000 [r/min]	Set the rotating speed of jog operation.
200	0 to 200 [%]*	Set the torque limit value of jog operation. The default value is motor starting torque. The rated torque being 100%.
0	0: Signed 1: Absolute value	Sets the display method of monitored speed.

* Setting unit: 1

8.5 Description of system parameters

You can select the initial screen display and set the digital/analog switching.

Note When a system parameter is changed, the new parameter will become effective only after the power is cycled.

■ Operation setting parameters

Use to navigate through the items.

Initial value	Setting range	Description
0	0: Operating speed [r/min] 1: Conveyor transfer speed [m/min] 2: Load factor [%] 3: Operation data number 4: Top screen of monitor mode	Selects the initial screen to be displayed when the data setter starts communicating with the driver.
1	0: Analog disabled (digital enabled) 1: Analog setting of speed & acceleration/deceleration 2: Analog torque limit	Set the rotating speed, acceleration time/deceleration time and digital/analog switching of torque limit.
0	0: Disable 1: Enable	Enable/disable the operation prohibited during initialization alarm.
1	0: Lock after natural stop 1: Lock immediately	Set the operation timing of the electromagnetic brake upon occurrence of an alarm. When "0: Lock after natural stop" is selected, the electromagnetic brake actuates after the motor has naturally stopped to hold the position.

Note

- For use in a lift device, set the parameter for electromagnetic brake operation upon alarm [SyS-0-06] to “1: Lock immediately.” If “0: Lock after natural stop” is selected, the load will drop.
- If a sensor error alarm generates, the electromagnetic brake will lock immediately regardless of the setting of the parameter for electromagnetic brake operation upon alarm [SyS-0-06].

• Setting example of digital/analog input signal selection parameter [SyS-0-04]

Digital/analog input signal selection [SyS-0-04]	Data No.	Speed setting	Acceleration time/ deceleration time setting	Torque limit
0: Analog disabled (digital enabled)	0 to 7	Digital	Digital	Digital
1: Analog setting of speed & acceleration/deceleration	0	Analog (internal)*1	Analog (internal)*3	Digital
	1	Analog (external)*2	Analog (internal)*3	Digital
	2 to 7	Digital	Digital	Digital
2: Analog torque limit	0 to 7	Digital	Digital	Analog*4

*1 Internal: Internal potentiometer

*2 External: External potentiometer or external DC voltage

*3 Internal: Acceleration time setter and deceleration time setter in the driver

*4 External potentiometer or external DC voltage

The external potentiometer (20 kΩ, 1/4 W) supplied with the **BLE** series can also be used for torque adjustment.

8.6 Initializing parameters

You can revert parameters saved in the driver to their initial values.

For details, refer to 10.6, “ Initializing driver data” on p.39.

9 Test mode

I/O signals can be checked without connecting the motor. You can also operate the motor without connecting the host controller.

9.1 What you can do in the test mode

- I/O test

Perform I/O test to check the connection condition between the driver and host controller. I/O test can be performed without connecting the motor.

You can check the ON/OFF status of each input signal of the driver, or switch the ON/OFF status of each output signal on the **OPX-2A**.

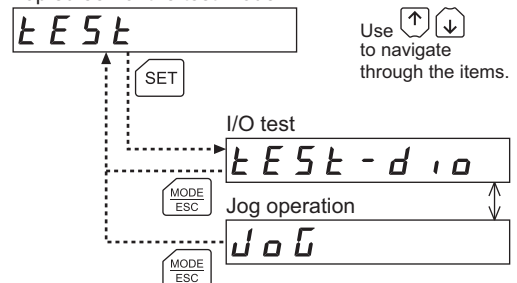
- Jog operation

You can operate the motor using the keys on the **OPX-2A**.

9.2 Operation in the test mode

- Use the **[MODE/ESC]** key to select the test mode.
- Press the **[SET]** key in the top screen of the test mode.
The display changes to the test mode item screen.
- Use the **[↑]** **[↓]** keys to select the item you want to perform.

Top screen of the test mode



Note

- Stop the motor operation before changing to the test mode.
- In I/O test, only the I/O signals are checked and the motor does not operate.
- In jog operation, the motor can be operated only with the operation of **OPX-2A** keys.

What happens when the **[SET]** key is pressed while the motor is operating

While the motor is operating, you cannot move to any lower level from the top screen of the test mode. Pressing the **[SET]** key will generate an error, and “oPE-Err” will be shown.

Be sure to stop the motor operation before pressing the **[SET]** key.

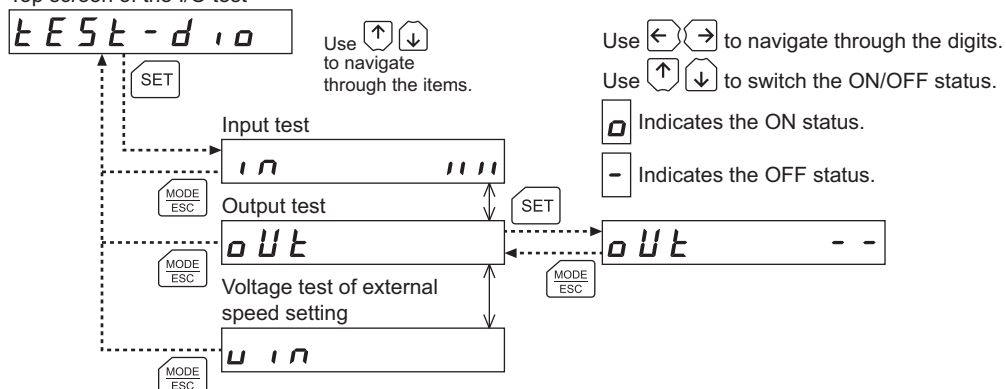
o P E - E r r

9.3 I/O test

You can check the ON/OFF status of each input signal of the driver, or switch the ON/OFF status of each output signal on the **OPX-2A**.

You can also check the voltage value input by the external potentiometer or DC voltage value input externally.

Top screen of the I/O test



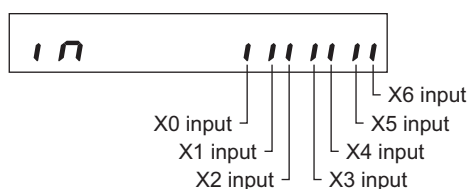
• Checking I/O signals

On the I/O signal check screen, each digit on the 7-segment LED display corresponds to a signal.

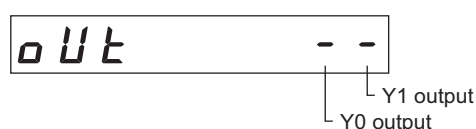
In input test, the LED becomes lit when the signal is ON, and unlit when the signal is OFF.

In output test, signal ON/OFF can be switched.

• Input test



• Output test



• Voltage test of external speed setting (display unit: V)



When setting the speed by means of external DC voltage, you can test whether voltage is input.

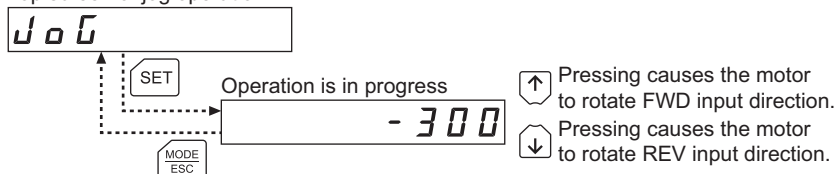
If 10 VDC is selected, a value corresponding to one half the input voltage is displayed.

9.4 Jog operation

You can operate the motor using the keys on the **OPX-2A**. The operating speed corresponds to the value set in the jog operation speed parameter [APP-3-00] and the torque corresponds to the value set in the jog operation torque parameter [APP-3-01] (see P.30).

The next example shows the display that appears when the default rotating speed is set to 300 r/min and the **【↓】** key is pressed to operate the motor in the counterclockwise (CCW) direction. When jog operation is performed, the rotating speed is displayed.

Top screen of jog operation



Note

During jog operation, the motor rotates at the specified operating speed while each applicable key is pressed. Before commencing jog operation, consider the status of the equipment and condition of its surroundings to confirm thoroughly that motor rotation will not cause any dangerous situation.

10 Copy mode

The **OPX-2A** has four data banks, and operation data and parameters can be saved in each of these data banks. Since an EEPROM is used as the data memory element, stored parameters will be retained even after the power is turned off.

In the copy mode, you can download parameters saved in the **OPX-2A** to the driver. You can also upload parameters saved in the driver to the **OPX-2A**.

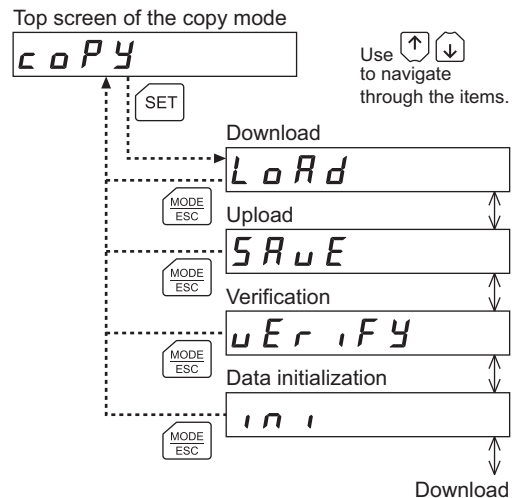
It is also possible to verify parameters in the **OPX-2A** against the corresponding parameters in the driver, or revert driver parameters to their initial values.

10.1 What you can do in the copy mode

- **Download**
Copy parameters saved in the **OPX-2A** to the driver.
- **Upload**
Copy parameters saved in the driver to the **OPX-2A**.
- **Verification**
Verify parameters in the **OPX-2A** against the corresponding parameters in the driver.
- **Initializing driver parameters**
Revert parameters saved in the driver to their initial values.

10.2 Operation in the copy mode

1. Use the **[MODE/ESC]** key to select the copy mode.
2. Press the **[SET]** key in the top screen of the copy mode.
The display changes to the copy mode item screen.
3. Use the **[↑]** **[↓]** keys to select the item you want to perform.



Note

- Stop the motor operation before changing to the copy mode.
- When you move from the top screen of the copy mode to a lower level, the FWD/REV input will be disabled.

- What happens when the 【SET】 key is pressed while the motor is operating

While the motor is operating, you cannot move to any lower level from the top screen of the copy mode. Pressing the 【SET】 key will generate an error, and “oPE-Err” will be shown.

oPE - Err

Be sure to stop the motor operation before pressing the 【SET】 key.

- What happens when the 【SET】 key is pressed while the edit lock is enabled

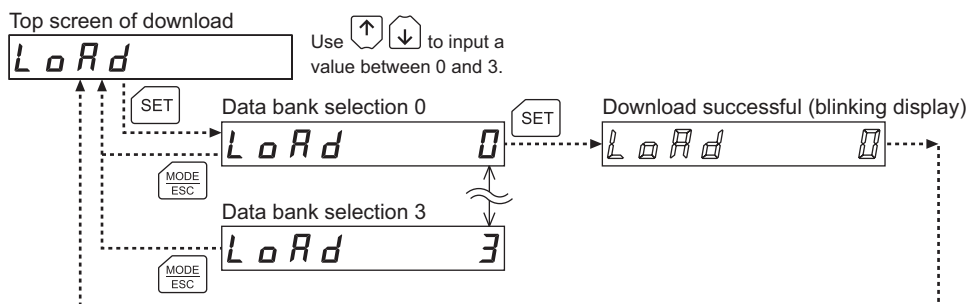
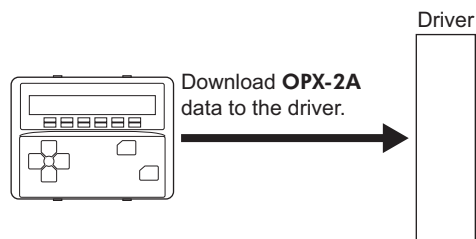
While the edit lock is enabled, you cannot move to any lower level from the top screen of the copy mode. Pressing the 【SET】 key will generate an error, and “Lock-Err” will be shown.

Lock - Err

Be sure to cancel the edit lock before pressing the 【SET】 key. Refer to p.7 for the procedure to cancel the edit lock.

10.3 Downloading to the driver

In this operation, data in the specified data bank number are downloaded to the driver.



Note

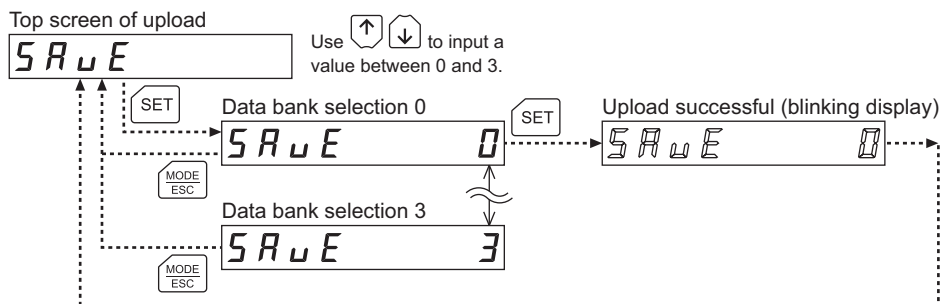
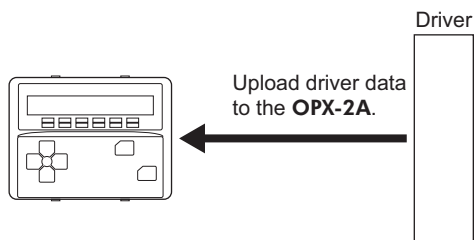
- System parameters that have been changed will become effective after the power is cycled. If the system parameters have been changed as a result of the download, cycle the driver power.
- Do not turn off the driver power while the download is still in progress (= while the display is blinking). Doing so may damage the data.

If a download error occurs, a code indicating the nature of the error will blink on the display. Download will not be performed and the display will return to the top screen of download.

Blinking display	Description	Action
<i>Prod - Err</i>	The product series of the driver to which data is downloaded is wrong.	<ul style="list-style-type: none"> • Check the product series of the driver. • Check the data bank number on the OPX-2A.
<i>HEAD - Err</i> <i>bcc - Err</i>	An error occurred while data was being downloaded.	Perform download again. If the same error occurs, the data saved in the OPX-2A may be damaged. Upload the applicable data to set the OPX-2A data again.
<i>no - data</i>	The specified data bank number does not contain parameters.	Check the data bank number.
<i>data - Err</i>	An error occurred while data was being written.	Perform download again.

10.4 Uploading to the OPX-2A

In this operation, data saved in the driver is uploaded to the specified data bank number.



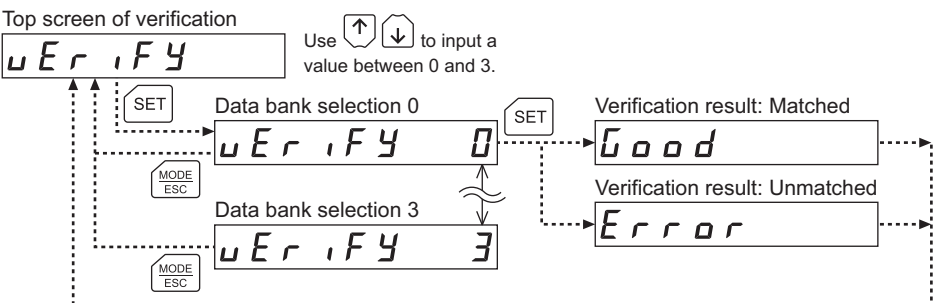
Note

Do not turn off the driver power while the upload is still in progress (= while the display is blinking). Doing so may damage the data.

10.5 Verifying parameters

In this operation, parameters in the specified data bank number are verified against the corresponding parameters saved in the driver.

If the verification finds that the two sets of parameters match, “Good” will be shown. If the two do not match, “Error” will be shown.



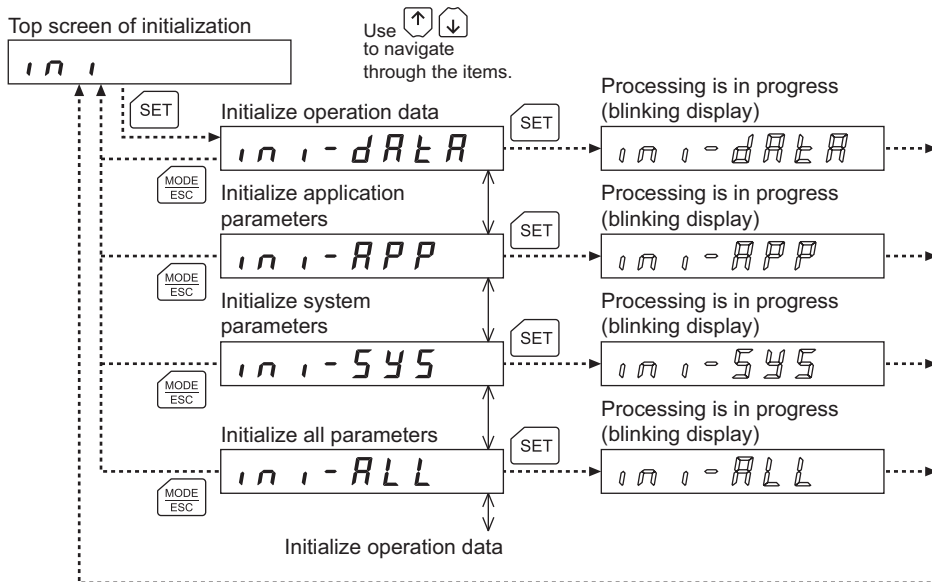
If a verification error occurs, a code indicating the nature of the error will blink on the display.

Verification will not be performed and the display will return to the top screen of verification.

Blinking display	Description	Action
<i>Prod-Err</i>	The product series of the driver against which data is verified is wrong.	<ul style="list-style-type: none">• Check the product series of the driver.• Check the data bank number on the OPX-2A.
<i>HEAD-Err</i> <i>bcc-Err</i>	An error occurred while data was being verified.	Perform verification again. If the same error occurs, the data saved in the OPX-2A may be damaged. Upload the applicable data to set the OPX-2A data again.
<i>no-data</i>	The specified data bank number does not contain parameters.	Check the data bank number.

10.6 Initializing driver data

In this operation, parameters saved in the driver are reverted to their initial values.



Note

- System parameters that have been changed will become effective after the power is cycled. If the system parameters have been changed as a result of the initialization, cycle the driver power.
- Do not turn off the driver power while the initialization is still in progress (= while the display is blinking). Doing so may damage the data.

11 Alarm list

Alarm code	Alarm name	Cause	Remedial action	Reset by OPX-2A
20	Overcurrent	Excessive current has flown through the driver due to ground fault, etc.	<ul style="list-style-type: none"> • Check the wiring between the driver and motor for damage. • If the alarm does not reset even after the power supply has been cycled, contact the Oriental Motor branch or sales office near you. 	Not possible
22	Overvoltage	<ul style="list-style-type: none"> • The main power supply voltage applied to the driver exceeded the rated voltage by approx. 20% or more. • Gravitational load operation was performed or otherwise a load exceeding the permissible load inertia was driven. 	<ul style="list-style-type: none"> • Check the main power supply voltage. • If this alarm generates during operation, decrease the load or increase the acceleration/ deceleration time. Or, use a regeneration resistor. 	Possible
25	Undervoltage	The main power supply voltage applied to the driver dropped by approx. 40% or more from the rated voltage.	<ul style="list-style-type: none"> • Check the main power supply voltage. • Check the wiring of the power supply cable. 	Possible
28	Sensor error	The motor sensor signal line experienced an open circuit during operation, or the sensor connector came off.	Check the connection of the driver and motor cables.	Possible
2D	Main circuit output error ^{*1}	An open circuit or non-connection of the motor drive line.	Check the connection of the driver and motor cables.	Possible
30	Overload	A load exceeding the rated torque was applied to the motor for 5 seconds or more.	<ul style="list-style-type: none"> • Decrease the load. • Review the operation pattern settings such as the acceleration/ deceleration time. 	Possible
31	Overspeed	The rotating speed of the motor output shaft exceeded approx. 4800 r/min.	<ul style="list-style-type: none"> • Decrease the load. • Review the operation pattern settings such as the acceleration/ deceleration time. 	Possible
41	EEPROM error	<ul style="list-style-type: none"> • Stored data was damaged. • Data can no longer be written or read. 	<ul style="list-style-type: none"> • Initialize the parameters. • If the alarm does not reset even after the power supply has been cycled, contact the Oriental Motor branch or sales office near you. 	Not possible
42	Sensor error during initialization	The motor sensor signal line experienced an open circuit before main power supply turn on, or the sensor connector came off.	Check the connection of the driver and motor cables.	Possible
46	Operation prohibited during initialization ^{*2}	The main power supply was reconnected when the FWD input or REV input was ON.	Cycle the control power supply after turning the FWD input and REV input OFF.	Possible

Alarm code	Alarm name	Cause	Remedial action	Reset by OPX-2A
51	Regeneration unit overheat	An overheated regeneration resistor was detected.	The power consumption of the regenerative resistor exceeds the permissible level. Review the load condition and operating conditions.	Possible
		The lead wire for the thermostat output from the regenerative resistor became open during operation.	Check the connection between the lead wire for the thermostat output from the regenerative resistor and CN5 on the driver.	
6E	External stop ^{*3}	EXT-ERROR input turned OFF.	Check the EXT-ERROR input.	Possible

*1 This alarm is disabled if the torque limit is set to less than 200%.

*2 This alarm is active when the parameter for “operation prohibited during initialization” alarm [Sys-0-05] is set to “Enabled.” Note that this alarm is disabled in the **FBL II** compatible mode.

*3 This alarm generates only when the EXT-ERROR input is assigned.

Note Overcurrent and EEPROM error alarms cannot be reset on the **OPX-2A**. To reset these alarms, you must cycle the power. After the power has been shut off, wait for at least 30 seconds before cycling the power. If normal operation cannot be restored after cycling the power, the internal circuit may be damaged. Contact the Oriental Motor branch or sales office near you.

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